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ABSTRACT

This elementary teacher education program was designed to improve the instruction of mathematics in Unified School District #250, Pittsburg, Kansas. The program was implemented by Kansas State College of Pittsburg and sponsored by the National Science Foundation. The project consisted of three phases: a) a 6-week summer institute designed to up-date the mathematical background of elementary school teachers, b) a fall semester in-service course designed to assist key personnel in implementing instructional improvement projects in the elementary schools, and c) monthly in-service meetings for all elementary classroom teachers. Evaluation for the first phase of the project revealed profitable experiences by the participants. (Included in the report are procedures for future evaluation of the remaining two phases, the budget report from the National Science Foundation, and a discussion of the personnel involved in all three phases.) (BRB)

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COOPERATIVE COLLEGE - ELEMENTARY SCHOOL PROJECT IN MATHEMATICS

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PART I

Summary of Project

The closing of the laboratory schools on the campus of Kansas State College of Pittsburg at the end of the school year 1970-71 necessitated a change in the teacher education program. The program is moving in the direction of a field based one with the professional semester off-campus; however, many students will still be assigned to the Pittsburg Public Schools for their cadet teaching. In addition the inclusion of a pre-professional experience in the sophomore and junior years will place even more prospective teachers in the Pittsburg classrooms for observation and tutorial experiences. The desire to provide the best possible classroom instruction, not only for the students in attendance, but as an example for the prospective teachers who will also be there, resulted in a cooperative program between the Pittsburg Public Schools and Kansas State College. The Department of Mathematics of the College and Pittsburg Unified School District #250 received a grant from the Cooperative College-School Science (CCSS) Program of the National Science Foundation for a curriculum improvement project.

The Project involved three phases: (1) the up-dating of the mathematical background of approximately half of the elementary classroom teachers through a six-weeks summer (1971) institute; (2) an in-service course during the fall semester of 1971-72, designed to assist "key personnel" in assuming leadership roles in implementing instructional improvement projects in each of the elementary schools; and (3) monthly in-service meetings for all elementary classroom teachers. Throughout the academic year the Director of the Project has served as a consultant in the school system, teaching demonstration classes for small groups of classroom teachers and cadet teachers assigned to the school system.

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PART II

Comprehensive Explanation and Analysis

Description and Development of Program

The Pittsburg (Kansas) Public School System and the Department of Mathematics at Kansas State College of Pittsburg are jointly concerned with the quality of mathematics being presented in the elementary school classroom. Discussions between concerned personnel from the public schools and the college concentrated primarily on what could be done locally, with the wide range effects as secondary considerations. The major concern of course was the elementary student in the classroom, but the fact that the elementary classroom setting in Pittsburg was often the training ground for prospective elementary teachers in an observation, tutorial, or student teaching role, could not be ignored. Original planning considered the various areas that stood to gain from such a project and attempted to involve personnel from those areas directly concerned.

Under the direction of Dr. Forrest Coltharp, Department of Mathematics at Kansas State College, and Mr. David Huffman, Assistant Superintendent of Instruction in the Pittsburg School System, a proposed program was devised and a proposal submitted to the National Science Foundation for funding of the project. As a joint venture between a public school system and an institution of higher education, the project was submitted to, and received funding from, the Cooperative College-School Science Program of NSF.

The project consisted of three phases: (1) a six-week summer institute, (2) a fall semester in-service institute course, and (3) monthly in-service meetings. The Project calendar was as follows:

1971 Summer -- (June 21-July 30) Six (6) week Summer Institute for forty-one participants consisting of thirty-five elementary classroom teachers and six elementary principals. Classes were held on the campus of Kansas State College of Pittsburg, with emphasis upon content and methods of teaching the modern mathematics programs, K-6.

1971 Fall -- In-Service Institute Class for fourteen key personnel who were selected during the summer session by the staff as potential leaders in their respective buildings to work in a supervisory position. Class is offered through extension with emphasis upon content and procedures essential in implementing the new mathematics textbook series in their respective schools.

1971-72 Academic Year -- Monthly meetings to discuss problems arising from the newly adopted mathematics series. Key personnel from the In-Service Institute class are being used to lead discussions and present demonstrations for their fellow teachers in their respective schools.

Major Objectives of Project

It is the purpose of this project to:

(1) up-date the background of the elementary classroom teachers (K-6) of Unified School District #250, Pittsburg, Kansas, in the content of contemporary mathematics;

(2) select, adopt, and implement a modern elementary mathematics program;

(3) establish a Materials Center where materials are available in mathematics for use throughout the school system;

(4) assist elementary classroom teachers identified as "helping teachers" to assume an active leadership role in implementing instructional improvement projects in mathematics among their fellow teachers;

(5) identify "key personnel" to serve as consultants, and to assist these consultants and the elementary principals of the schools involved in the project to assist in the retraining of all teachers and to work with them during implementation and evaluation of new curricula;

(6) evaluate the results of curriculum improvement program in terms of teacher and pupil behavior.

Personnel Involved

Elementary school teachers and principals from Unified School District #250, Pittsburg, Kansas, were notified early in January that the curriculum improvement project planned jointly with Kansas State College of Pittsburg had been funded by the National Science Foundation. The announcement was made by the Director, Dr. Forrest L. Coltharp, at a meeting of all elementary school personnel held at George Nettels Elementary School and brochures were distributed. Selection and notification of participants was made by March 15 with April 1 as a confirmation date. Forty-one (41) participants were selected jointly by the Director and School District Representative to participate in the Summer Institute phase of the project. The proposal called for selection of thirty-six participants, but an excess in the amount of dependency allowance allowed for funding five additional participants.

The participants selected represented all six elementary schools in USD #250, every grade level, kindergarten and special education. The following tables show the breakdown of school and grade level distribution.

School	No. of Participants
Eugene Field	8
Lakeside	9
Lincoln	7
George E. Nettels	5
Washington	3
Westside	7
Lone Star Spec. Educ.	2

Grade Level	No. of Participants
K	1
1	6
2	4
3	2
4	5
5	6
6	8
Spec. Educ.	2
Music	1
Principals	6

The following vitae are furnished for the Director, mathematics staff members, school district representative, and State Consultant, in that order:

Coltharp, Forrest L., Ed.D., Oklahoma State University, 1968. Professor of Mathematics. Taught high school mathematics, 1957-64. Served as Mathematics Consultant for school system in city of 24,000, 1962-64. Served as Center Coordinator for S.M.S.G. Mathemaitcs through Science Project, 1962-64. Taught N.S.F. Summer Institute for junior high mathematics teachers, 1964. Responsible for elementary teacher education in mathematics at Kansas State College, 1964-71. Taught In-Service classes in modern mathematics evenings, through extension, and summers, 1964-71. Served as mathematics consultant and instructor for the Kansas Elementary Mathematics and Science (KEMS) project federally funded by N.S.F., August, 1968 and academic year, 1968-69. Director of CCSS Project in Elementary Mathematics (Grant No. GW-6489) Summer Institute 1971 and academic year 1971-72. Special Field of Interest: Elementary Mathematics Teacher Education.

Hight, Donald W., Ed.D., Oklahoma State University, 1961. Professor of Mathematics. NCTM Professional Affairs Committee, 1967-69, Chairman 1968-69. Editor, Bulletin of the Kansas Association of Teachers of Mathematics, 1963-69. Instructor, NSF In-Service Institutes, 1962-65; NSF Institutes, Summers, 1963-69. Instructor, CCSS Project in Elementary Mathematics, Summer 1971. Special Fields of Interest: Analysis and Mathematics Education.

Kriegsman, Helen, Ph.D., Ohio State University, 1964. Professor and Chairman, Department of Mathematics. NCTM Committee on Affiliated Groups, 1966-69, Chairman, 1968-69. NCTM Board of Directors, 1969-72. Supervisor, Mathematics Education, College High Laboratory School, 1947-60. Secretary, Kansas Section of Mathematical Association of America, 1958-67. Instructor, NSF In-Service Institutes, 1964-67, NSF Institutes, Summers, 1963-67. Instructor, CCSS Project in Elementary Mathematics, Summer 1971. Special Fields of Interest: Geometry, history of mathematics, and mathematics education.

Huffman, David L., Ed.S. Kansas State College of Pittsburg, 1965. Assistant Superintendent of Instruction, Unified School District #250. Elementary classroom teacher (two years), teaching principal (ten years), and full-time elementary principal (three years). Participant in NSF Institute in elementary science teaching and programs at Kansas State College of Pittsburg, 1962. Participant in Reading Institute at Arkansas State College, 1966. Thesis for Ed.S. involved a comparative study of traditional arithmetic with modern mathematics in the elementary grades.

Bell, Warren, J., M. Ed., University of Nebraska, Lincoln. Director of Curriculum, Kansas State Department of Education, Topeka. Serving as State Department Representative in CCSS Project hosted by Kansas University, Summer 1971 and academic year 1971-72.

Summer Institute courses were selected and designed to meet the needs of each participant according to his individual background. The majority of the participants took the two courses: Mathematics 309 - Informal Geometry and Mathematics 306 - Algebra for Elementary Teachers.

The following chart indicates the distribution of participants in the four content courses. All participants were involved in the Seminar.

Logic & Sets	Mod. Math. for Elem. Teachers	Informal Geometry	Algebra for Elem. Teach.	Seminar
		27	27	27
6			6	6
	4	4		4
1		1		1
	1			1
			2	2
7	5	32	35	41

The Seminar in the afternoon was an important component of the program. All of the participants in their evaluation of the Summer Institute indicated they profited the most from the Seminar. The schedule called for all participants to be involved from 1:30 p.m. until 3:30 to 4:00 p.m. every afternoon except Friday.

Tuesday afternoon of the first week was devoted to the study of behavioral objectives. Mr. Warren Bell, Curriculum Consultant from the State Department of Education used the IOX filmstrips, recordings and other materials to develop the participant's ability to write behavioral objectives in mathematics. The remaining afternoons of the first and second weeks were devoted to studying, analyzing and evaluating the elementary mathematics programs of seven different book companies. Monday of the third week was a national holiday (July 5) but Tuesday and Wednesday afternoons were spent summarizing and selecting an elementary mathematics series for the Pittsburg School System. After careful evaluation the almost unanimous choice of all participants was the Houghton-Mifflin elementary mathematics series.

The next part of the Seminar involved dividing the participants into two groups. One group of twenty-two participants was involved in role playing. Each participant was assigned a topic by the Director to research

in the newly adopted textbook series and to teach to the remaining participants. The School District Representative would also assign three or four student roles to be played by the participants and a discussion would follow each presentation, not only pertaining to the topic presented but how the "teacher" handled the situation arising out of the role playing. The School District Representative and Director used publication #30 of the Commission on Undergraduate Education in the Biological Science, entitled "Role Playing and Teacher Education: A Manual for Developing Innovative Teachers," to guide the activities of the group involved in role playing.

The other nineteen participants were involved in evaluating the materials contained in the Instructional Materials Center (IMC) and the Demonstration Library, located within the local school system. As they evaluated the material they studied their newly adopted textbooks and outlined where various teaching aids and materials could be used in the classroom to present a particular topic. This same group evaluated the supplemental material available with the newly adopted series and recommended what could best be used to assist the classroom teacher in doing a better job presenting the new material.

A consultant, Dr. Jack Phelps of Northwestern State College in Alva, Oklahoma, was successful in actively involving the participants in a workshop approach to mathematics. His presentation complemented many of the activities introduced throughout the summer in the content courses and involved many situations which could be taken back to the classroom.

The selection of fourteen "key personnel" as participants in the academic year In-Service course occurred during the summer. The project staff under the guidance of the project Director selected the participants according to the following criteria:

(a) enthusiasm for and effectiveness in the teaching of modern school mathematics,

(b) subject matter knowledge in mathematics sufficient to teach the subject in all grades K-6,

(c) understanding of the elementary school pupils and the goals of education at this level,

(d) leadership capabilities in terms of peer elementary school teachers.

These fourteen participants, representing each elementary school are involved in an in-service class during the fall semester which carries three (3) hours of graduate credit, tuition-free. These key people are organizing and conducting the monthly in-service meetings for all elementary classroom teachers in Pittsburg. Their in-service classes concentrate on problems encountered in implementing the newly adopted series. They are available in their schools to assist fellow teachers with problems that arise. The Director is conducting the in-service classes, supervising the monthly meetings and visiting in the classrooms as much as an otherwise full-time teaching schedule will allow.

The "key personnel" planned, organized and conducted a Conference on Elementary School Mathematics on November 16, 1971. (See attachment #1). Sponsored jointly by the Pittsburg Public Schools and the Department of Mathematics of Kansas State College, the conference was attended by elementary education majors from Kansas State College, classroom teachers from surrounding school districts and all eighty-five elementary classroom teachers in the Pittsburg School System. This conference held on Tuesday afternoon and evening was considered extremely worthwhile by all in attendance.

The fourteen participants also attended the Oklahoma City "Name-of-Site" meeting of the National Council of Teachers of Mathematics on Friday and Saturday, October 8 and 9. Many classroom techniques, procedures and ideas were gathered at this meeting and carried back and shared with fellow teachers.

Budget

The budget granted by National Science Foundation was $31,388, with $20,520 for participant support and $10,868 for operating costs. (See attachment #2). Fees were waived by the College for all course work

taken on this program which would have amounted to approximately $3,847. The Pittsburg Public Schools allotted $5,000 in its budget for a modern textbook series for the complete system and supplementary materials to go along with the program. The Pittsburg Public School system also supported the fourteen "key personnel" in attending the Oklahoma City NCTM meeting in October by furnishing transportation, banquet tickets, and the expenses for substitute teachers to cover their classroom. These expenses cost approximately $320. The Elementary School Mathematics Conference cost the College an additional $320 for speaker honorariums, program printing, and refreshments for the break. This brings the total expenditures to approximately $40,875.

Evaluation Procedures

Each phase of the project either has been, or will be, evaluated uniquely by those involved in that particular phase. The Summer Institute was evaluated by the participants during the seminar on Tuesday, Wednesday, and Thursday of the last week. Tuesday and Wednesday seminars were spent sharing ideas gathered and results obtained by the two groups, one that had role played and the other evaluated the Materials Center. Each group felt their activity to be the most profitable for them individually, but all wished they had been involved in both experiences. Thursday was devoted to a written evaluation by the participants of the complete Institute. Each instructor for the content courses also evaluated his own class and determined the students' achievement. The results compared favorably to previous classes which generally contained better prepared students.

The Director of the Project as instructor of the In-Service class for the "key personnel" will evaluate on the basis of involvement in helping fellow teachers within their individual schools. Each "key person" will have five demonstrations or laboratory experiences that he can use in assisting fellow teachers. These will be shared among the "key people" and actually extend the repertoire of each participant.

Evaluation of the monthly meetings will be made by the building principals through feedback from their teachers. The best evaluation of the complete project would take place in the various classrooms, which is a difficult, if not an insurmountable, task.

The Cooperating Teachers will evaluate the effect of the project on the cadet teachers assigned to Pittsburg classrooms through evaluation sessions scheduled for the end of the semester.

Contribution to Improvement of Teacher Education

The contribution of this project to Teacher Education at Kansas State College will best be evidenced in the years to come. The "cadet teachers" assigned to Pittsburg classrooms will have the opportunity of working with and observing well trained, veteran teachers. The College Supervisors are working closely with Mr. David Huffman, Assistant Superintendent of Instruction, to assure that each "cadet teacher" is placed with the best possible cooperating teacher. The sophomores and juniors who are in the Pittsburg schools for observation and tutorial experiences on the Pre-Professional Laboratory experience will be involved in the planning and preparing of teaching aids to be used in the classroom.

Cadet teachers, Pre-Professional Laboratory students and many other elementary education students attended the Conference on Elementary School Mathematics on November 16, 1971. Contact with classroom teachers, sharing experiences, and gathering expert ideas on various topics relevant to elementary school mathematics made the conference very beneficial to all in attendance.

The Director and staff of the summer institute worked cooperatively with the participants from the Pittsburg Public Schools to devise course work relevant to the elementary classroom. The techniques of discovery, demonstrations and laboratory activities developed have been incorporated into the content courses for the undergraduate elementary education majors.

ATTACHMENT 2

NATIONAL SCIENCE FOUNDATION
Washington, D. C. 20550

EDUCATION
GRANT BUDGET & FISCAL REPORT

Form Approved
Budget Bureau No. 99-R0168

Please read reverse instructions carefully before completing this form.

INSTITUTION & ADDRESS	NSF PROGRAM	PROJECT PERIOD	
		Summer	Acad. Year
Kansas State College of Pittsburg Pittsburg, Kansas	PES/CCSS	19 71 : 6 wks.	
	PROJECT DIRECTOR Forrest L. Coltharp	19 71-72 :	5 mos.
		19 :	

FOR NSF USE	GRANT NUMBER	PROPOSAL NO.	REPORTING PERIOD	GRANT AMOUNT	GRANT BALANCE
	GW-6489	1/1643	FROM TO	31,388	Same as 36 below.

A. PARTICIPANT SUPPORT	No.	Rate	Grant Budget I	Expenditures II (Do Not Round)	Total No Paid
1. Summer stipends:	36	@ $60/wk. for 6 wks.	12,960		
2. Dependency allowances:	84	@ $15/wk. for 6 wks.	7,560		
10. Total Participant Support			20,520		

B. OPERATING COSTS			
11. Director (admn. $1,950 ; inst. $1,575)	3,525	11	
12. Secretarial & Clerical	750	12	
13. Fringe Benefits (When charged as Direct Cost)	795	13	
14. Office Supplies, Communications, Publicity	200	14	
15. Travel		15	
16. Fees (Health)	230	16	
17. Directors' Meeting	200	17	
18.		18	
19		19	
20. Staff 1 F.T.; 1 P.T.	3,150	20	
21. Guest Lecturers 2	400	21	
22. Assistants 2	200	22	
23. Laboratory & Instructional Materials		23	
24. Field Trips		24	
25		25	
26		26	
27		27	
28. Total subject to Indirect Costs (add 11 thru 27)	9,450	28	
29. Allowance for Indirect Costs 15%	1,418	29	
30		30	
31		31	
32		32	
33. Total Operating Costs from NSF (add 28 thru 32)	10,868		

C. GRANT & EXPENDITURE TOTALS		
34. Total Granted by NSF (10 + 33, column I)	$31,388	
35. Total Expenditures Charged to Grant (10+33, col. II)		
36. Unexpended Balance (34 minus 35)		

We certify that the expenditures listed above are properly chargeable to this Grant.

SIGNATURE OF BUSINESS OFFICER	TYPED OR PRINTED NAME & TITLE	DATE
SIGNATURE OF PROJECT DIRECTOR	TYPED OR PRINTED NAME	DATE

NSF Form 135 (December 1967)